

What is claimed is:

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1. A method for manufacturing and analyzing a semiconductor die, the method comprising:
- forming a plurality of heating elements in the die;
- while operating the die, selectively controlling the heating elements and therein causing at least one of the heating elements to heat at least one adjacent portion of the die; and
- analyzing the die via the operation.
2. The method of claim 1, wherein operating the die includes running a test pattern on a portion of the die suspected to cause a failure.
3. The method of claim 1, wherein operating the die includes electrically coupling the die to a signal generator adapted to supply test signals to the die.
4. The method of claim 1, further including detecting that the die is malfunctioning.
5. The method of claim 4, further comprising:
- identifying the portion of the die being heated at the time that a malfunction is detected; and
- correlating the portion of the die being heated to a critical timing path.

1 6. The method of claim 5, further comprising probing circuitry in the critical
2 timing path and determining therefrom the nature of a defect.

1 7. The method of claim 1, wherein the die includes at least one of: a flip-chip
2 bonded die and a wire-bonded die.

1 8. The method of claim 1, further comprising selectively controlling the heating
2 elements and therein causing at least one of the heating elements to draw power in a
3 manner that slows the operation of circuitry in at least one adjacent portion of the die.

1 9. The method of claim 1, further comprising electrically coupling the die to a
2 package, wherein selectively controlling the heating elements includes applying an
3 electrical signal to the heating elements via the electrical coupling to the package.

1 10. The method of claim 1, wherein selectively controlling the heating elements
2 includes causing a portion of the die to heat to a selected temperature.

1 11. The method of claim 1, wherein selectively controlling the heating elements
2 includes heating a plurality of the heating elements in a selected sequence.

1 12. The method of claim 1, wherein selectively controlling the heating elements
2 includes causing at least two of the heating elements to generate heat, and wherein the
3 at least two of the heating elements are located sufficiently distant from each other so

4 that heat from one of the elements does not interfere with heat from another one of the
5 elements in causing the die to heat.

1 13. The method of claim 1, wherein selectively controlling the heating elements
2 includes causing the at least one heating element to generate pulses of heat.

1 14. The method of claim 1, wherein selectively controlling the heating elements
2 comprises:

3 grouping the heating elements into selected groups, each group having two or
4 more heating elements;

5 causing the selected groups to heat in a sequence;

6 detecting a response from the die that indicates that the die is operating
7 defectively; and

8 in response to detecting the defective operation, identifying the selected group
9 being caused to heat when the response is detected; and

10 selectively operating individual heating elements of the selected group.

1 15. The method of claim 1, wherein selectively controlling the heating elements
2 comprises:

3 detecting a temperature characteristic related to the heated portion of the die;

4 and

5 in response to the detected temperature characteristic, controlling the heating via
6 a feedback loop.

1 16. The method of claim 15, further comprising forming a temperature sensor in the
2 die, wherein detecting a temperature characteristic includes detecting the temperature of
3 a portion of the die using the temperature sensor.

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1 (17.) The method of claim 16, wherein forming a plurality of heating elements
2 includes forming a transistor having a gate, and wherein forming the temperature sensor
3 includes electrically coupling the temperature sensor to provide feedback to bias the
4 gate, and therein regulate the current through the transistor and control the heat
5 generated.

1 18. The method of claim 1, wherein selectively controlling the heating elements
2 comprises:
3 electrically coupling the heating elements to a heat controller; and
4 supplying a signal from the controller to the heating elements and thereby
5 controlling the heating elements.

1 19. The method of claim 1, further comprising forming a control register in the die,
2 wherein selectively controlling the heating elements includes using the control register.

1 20. The method of claim 19, wherein selectively controlling the heating elements
2 includes providing a serial signal to the control register and using decoding and lookup

3 blocks at the control register to interpret the signal and activate one or more heating
4 elements based on the interpreted signal.

1 21. The method of claim 1, wherein forming a plurality of heating elements in the
2 die includes forming a grid of heating elements.

1 22. A system for analyzing a semiconductor die having a plurality of heating
2 elements formed therein, the system comprising:
3 control means for selectively causing at least one of the heating elements to
4 generate heat and to heat a portion of the die therefrom;
5 operating means for operating the die; and
6 detection means for detecting a response from the die.

1 23. A system for analyzing a semiconductor die having a plurality of heating
2 elements formed therein, the system comprising:
3 a controller adapted to selectively cause at least one of the heating elements to
4 heat at least one adjacent portion of the die;
5 a testing device adapted to operate the die; and
6 a detector adapted to detect a response from the die.

1 24. The system of claim 23, wherein the testing device and the controller are
2 included in a single testing arrangement.

1 25. The system of claim 23, wherein each heating element includes at least one of:
2 resistive metal, a transistor, a diode, doped metal and a polysilicon trace.

1 26. The system of claim 23, wherein the die further comprises a temperature sensor
2 formed therein and adapted to provide temperature feedback, and wherein the controller
3 is further communicatively coupled to receive the temperature feedback and to control
4 the heating in response thereto.

1 27. The system of claim 23, further comprising a stage to hold the die and
2 electrically couple the die to the testing device.

1 28. The system of claim 23, further comprising a computer communicatively
2 coupled to the tester and adapted to control the tester.

1 29. The system of claim 28, wherein the computer is further communicatively
2 coupled to the controller and adapted to direct the controller's operation.

1 30. The system of claim 23, wherein the detector and the testing device are included
2 in a single arrangement.

1 31. The system of claim 30, further comprising a computer communicatively
2 coupled to the controller, the testing device, and the detector, and wherein the computer

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